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PTO/SB/05 (2/98)
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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. **D.N.7158**
First Inventor or Application Identifier **Abrams, L.B.**
Title **Co-Molded Flock Transfer & Method**
Express Mail Label No. **09/629746**

APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. ☒ * Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ Specification [Total Pages **10**]
(preferred arrangement set forth below)
- Descriptive title of the invention
 - Cross References to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to Microfiche Appendix
 - Background of the invention
 - Brief Summary of the invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets **2**]
4. Oath or Declaration w/Power [Total Pages **12**]
- a. ☒ Newly executed (original or copy)
- b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))
(for continuation/divisional with Box 17 completed)
[Note Box 5 below]
- i. ☐ **DELETION OF INVENTOR(S)** —
Signed statement attached deleting
inventor(s) named in the prior application,
see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference (useable if Box 4b is checked)
The entire disclosure of the prior application, from which a
copy of the oath or declaration is supplied under Box 4b, is
considered to be part of the disclosure of the accompanying
application and is hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)
7. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
- a. ☐ Computer Readable Copy
- b. ☐ Paper Copy (identical to computer copy)
- c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. ☐ Assignment Papers (cover sheet & document(s))
9. ☐ 37 C.F.R. § 3.73(b) Statement ☐ Power of Attorney
(when there is an assignee)
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
12. ☐ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
14. ☒ * Small Entity Statement(s) ☐ Statement filed in prior application,
(PTO/SB/09-12) Status still proper and desired
15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. ☐ Other:

* NOTE FOR ITEMS 1 & 14: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY
FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.121), EXCEPT
IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.121).

17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: _____

Prior application Information: Examiner _____ Group / Art Unit _____

18. CORRESPONDENCE ADDRESS

☐ Customer Number or Bar Code Label

or ☒ Correspondence address below

(Insert Customer No. or Attach bar code label here)

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Signature		Date	07/24/00

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

Applicant or Patentee: Louis Brown Abrams Attorney's
Serial or Patent No. : _____ Docket
Filed or Issued: _____ No. 7158
For: "Co-Molded Flock Transfer and Method"

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) and 1.27(c) - SMALL BUSINESS CONCERN

I hereby declare that I am

- () the owner of the small business concern identified below:
(X) an official of the small business concern empowered to act on behalf of the concern identified below.

NAME OF CONCERN: High Voltage Graphics, Inc.
ADDRESS OF CONCERN: P.O. Box 41
Fort Collins, Colorado 80522

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention entitled

"Co-Molded Flock Transfer and Method"

inventor(s) Louis Brown Abrams
described in:

- (X) the specification filed herewith
() the application Serial No. _____
() Patent No. _____ issued _____

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e). *NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27).

NAME _____
ADDRESS _____
() INDIVIDUAL () SMALL BUSINESS CONCERN () NONPROFIT ORGANIZATION

NAME _____
ADDRESS _____
() INDIVIDUAL () SMALL BUSINESS CONCERN () NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING Louis Brown Abrams
TITLE OF PERSON OTHER THAN OWNER President
ADDRESS OF PERSON SIGNING P.O. Box 41
Fort Collins, Colorado 80522

SIGNATURE *Louis Brown Abrams*, President / DATE 4 July 2000
Louis Brown Abrams

SPECIFICATION

To All Whom It May Concern:

Be It Known That I, Louis Brown Abrams, a citizen of the United States, residing in the County of Larimer, and State of Colorado, whose post office address is P.O. Box 41, Fort Collins, Colorado 80522-0041, has invented new and useful improvements in

CO-MOLDED FLOCK TRANSFER AND METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable.

Field of the Invention

This invention relates to molded articles having flocked surfaces, and, in particular, to a new and improved method of applying flocked transfers to molded products.

Background of the Invention

It's often desirable to decorate molded plastic parts for aesthetic or practical purposes. Injection molded articles are often decorated using inks, screen printing, pad printing, direct electrostatic flocking and hot stamping. These methods are most often post-molding operations requiring additional processing and cost and time. In addition, the resulting quality of the product is often low, due to the low quality of adhesion or unevenness of the coating.

Recently In-Mold Decoration has been developed to incorporate the application of decoration while the part is being molded to eliminate the extra step; however, a number of problems have developed with this technology that relate to the inability of the ink or decoration to remain stable during the heat and force of injecting the resins into the mold, that relate to the difficulty of getting the inserted decoration to stay in place, and which may relate to the decoration surface becoming smeared, crushed, or otherwise disturbed during injection molding.

Summary Of The Invention

The present invention uses flock heat transfer type media rather than ink-printed film inserts in order to provide a plush, evenly-coated, three-dimensional textured decoration molded

together with the hot resins when the part is formed. Using flock transfer media, a plushly textured decoration is permanently attached to the surface of the molded part. In order to accomplish this the hot melt adhesive commonly used with flock heat transfer manufacturing is eliminated so it will not liquefy and ooze out around the decoration in the mold. In addition, another adhesive, such as a tie coat material, may be used instead of a normal hot melt to prevent oozing and to promote adhesion and/or chemical compatibility with the molding resin, when injecting molding a flock transfer directly to the polymer molded article.

The mold preferably has a depression or locating pins or other mechanical parts to assist with aligning and holding the decoration in place. Additionally, "dams" built into the mold around the perimeter of the flock heat transfer may be included in order to prevent seepage of the molding resin into the interstitial spaces of the flock transfer, between the fibers.

To further accommodate the incorporation of such a decoration in the injection mold, the molding process may be modified for example by purposely selecting resins of lower melting point or by injecting the resins in two separate stages, a first more "gentle" injection to set the decoration in place, followed up by a full-pressure normal injection of resin.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Figure 1 is a cross-sectional view a flock transfer being applied to an article in a mold, wherein the transfer lies on top of the article;

Figure 2 is a cross-sectional view similar to FIG. 1, but wherein the flock transfer is imbedded in the article;

Figure 3 is a top plan view of an embodiment of the present invention showing the flock transfer inside an injection mold cavity, wherein the flock transfer is created with a border and

Figure 4 is a top plan view of an embodiment of the present invention showing the flock transfer inside an injection mold, wherein the mold contains a border.

DETAILED DESCRIPTION OF THE INVENTION

In FIG. 1, a transfer 2 of the present invention is shown in place in a mold 4 to be co-molded with a plastic article 6. In FIG. 1, the transfer 2 is shown on top of the article 6. The transfer 2 comprises a dimensionally stable sheet 8 to which a conventional flock transfer release adhesive 10, usually silicone wax, is applied in the reverse of a desired pattern or with overall coverage of the sheet, corresponding to the overall image which is to be flocked and transferred. The flock 12 which may be rayon or any other type of material with a conductive finish such as nylon, polyester or the like is applied to the activated adhesive 10 in any conventional manner, such as, conventional electrostatic means, vibration, air flow or gravity. The method of applying the flock 12 to the adhesive 10 depends on the transfer to be achieved – will the transfer be one color or several colors, will the transfer include any non-flock decorations, etc. Thus, the transfer itself, can be a conventional flock transfers, Lextra or Lextra 3-D type transfer, flocked roll goods such as made by Societe D' Enduction et de Flokage, located in Laval, France, from which pieces may be cut out and even pre-formed to fit better into molds where the surface of the finished product is not flat. The lower ends of the flock 12 are coated with a permanent binder adhesive 14 such as a water based latex which binds the flock into a unit. The binder 14 may contain an additional adhesive, for promoting the adhesion of the transfer to the resin in molding.

A relatively weak pressure-sensitive adhesive 16 can be added to the carrier film 8 in a separate layer, for the purpose of helping to locate the flock transfer 2 in position inside the mold 4 if no mechanical device is available.

FIGS. 1 and 2 illustrate the application of the transfer 2 to a molded article 6 during the molding process. The transfer 2 is positioned in the mold 4 using the pressure-sensitive adhesive 12. Other methods, such as the use of a vacuum, can be used to hold the transfer 2 in place in the mold 4 during the molding operation. Vacuum holes 18 are shown in the mold 4 which pass through the mold body. As seen, the transfer 2 is in contact with the vacuum holes 18. A vacuum can be drawn through the holes 18 to hold the transfer 2 in place. The flock transfer needs to be held securely in the mold in order to maintain the transfer in the desired location on the finished plastic part. If a slight depression (of about 1mm) is built into the mold cavity to accommodate the flock transfer, it will be flush with the molded plastic surface of the finished part. This is seen in FIG. 2. If there is no depression, the flock decoration will stand up on top of the plastic surface, as seen in FIG. 1.

After the transfer is positioned in the mold, the mold is closed and hot resin is injected into the mold. To ensure that the transfer will stay in position during the resin injection, resin with a lower melting point than the release adhesive 16 is used to avoid dislocation of the transfer. On the other hand, if the melt point of any release adhesive utilized, is higher than that of resin, due to the flock providing insulation to the release adhesive, the release adhesive will really not melt in the first place, and is already cross-linked. Hence, criticality of this point may not be that necessary. A particularly preferred method of molding is Reaction Injection Molding (RIM) wherein two base resins are mixed together just as they enter the mold, a chemical reaction occurs at low heat and the plastic material of the end product is formed at that instant.

In an alternative method, lower-pressure injection may be used in a first stage in order to locate and secure the flock transfer in its precise position. Once the transfer is secured in place by the material of the initial injection, a second, full-pressure injection is made to finish the part.

After the resin is injected into the mold, the mold is cooled by circulating water around the exterior of the mold. Although, in some injecting molding processes, utilizing resin, cooling water may already be circulating through the die, during the injection molding process, and thereafter, as known in the art. The mold can be cooled in any other conventional manner. As the resin cools, it solidifies and forms a permanent adhesion to the binder 14. When the part is cooled sufficiently the mold opens up and the part is ejected. Finally, the release sheet 8 and release adhesive 10 are peeled off the fibers 12 to reveal a finished, flocked, surface on the newly molded part.

As an alternative to the invention as described above, it is likely that the flock 12 can be held by other means, to the molded polymer part 6, as follows. While the various release sheets, and release adhesive, may be initially applied to the upper surface of the flock layer, to hold it in position, during molding, rather than utilizing a permanent binder adhesive 14, to hold the flock within or to the molded part, there may be used a thermal setting polyester, such as available from Bostik, Inc., to permanently adhere the ends of the flock material thereto, and likewise, such a sheet will be cross linked into permanent connection with the molded polymer part 6, to provide a very inherently appearing flock surface, upon the molded part, when finished. Thus, the thermal setting polymer material directly cross links with the molding polymer substance, in the injection molding process, and cures with it, to form a permanently flocked product.

Since the flock of the transfer forms interstitial spaces between fibers, it is desirable to form a barrier between the mold and the perimeter of the transfer to prevent the resin from entering these interstitial spaces during injection of the resin into the mold. Referring to FIG. 3, a barrier 40 may be formed around the transfer 42. Barrier 40 can be formed during the fabrication

of the flock transfer, by providing an excess of binder adhesive 10 around the edge of the transfer. The excess binder adhesive 10 will form a rib or dam around the periphery of the transfer.

Alternatively, referring to FIG. 4, the mold 50 may be provided with a barrier 52, which surrounds transfer 54 when the transfer is placed in the mold. Barrier 52 may be an integral part of mold 50, or may be a separate, added barrier which is composed of silicone, latex or other suitable sealing material.

The in mold flock transfer of the present invention finds particular utility in finished plastic parts where a plush surface is desired.

Numerous variations will occur to those skilled in the art of molding in light of the above description. For example, the in-mold flock transfer decoration of the present invention could be adapted to other molding processes, such as blow molding, vacuum forming, rotational molding and transfer molding. The finished plastic part need not be a flat plane, but by virtue of the flexibility of the flock transfer may be rounded, or portions of the part may be raised. These are merely illustrative.

CLAIMS:

1. A method of decorating a molded article comprising:
providing a transfer having a flocking layer, a release sheet on one side of the flocking and a layer of binder adhesive on an opposite side of the flocking;

securing the release sheet to an interior wall of a mold in which the article is made; and

molding the part such that resin contacts the layer of binder adhesive;

cooling the mold;

ejecting the part; and

removing the release sheet from the transfer.

2. The method of claim 1 wherein the release sheet is affixed to the mold base with an adhesive.

3. The method of claim 1 wherein the release sheet is affixed to the mold by vacuum.

4. The method of claim 1 including a step of preventing the resin from entering interstitial spaces between the flocking.

5. The method of claim 4 wherein the preventing step includes forming a dam around the perimeter of the transfer.

6. The method of claim 5 wherein the dam is formed by placing a barrier in the mold, the transfer being positioned within the barrier.

7. The method of claim 5 wherein the dam is part of the transfer, the dam comprising a built up section of binder adhesive around the periphery of the transfer.

8. A method of decorating a molded article comprising:

coating a release sheet with a release adhesive;

flocking flock into said release adhesive by imbedding a first end of said flock into the release adhesive to result in at least one pattern of flock arranged to form a predetermined design adhered to said release sheet;

forming a barrier around the periphery of said flock;

affixing said release sheet to the interior surface of a mold; and

molding an article over said adhesive binder and thereby permanently bonding said flock to said article.

9. The method of claim 8 wherein said step of forming said barrier comprises applying a binder adhesive to said flock; said binder adhesive being built up around the periphery of said flock.

10. The method of claim 8 wherein said step of forming said barrier comprises providing a dam on the surface of the mold, the transfer being applied to the mold within the dam.

11. The method of claim 8 wherein the step of molding the article comprises injecting molten resin into the mold.

12. The method of claim 11 wherein the resin is initially injected at a first pressure, the first pressure being sufficiently low to prevent dislodgment of the transfer from the mold wall; and then providing a second injection of the resin at a second higher pressure.

13. The method of claim 11 wherein the injected resin has a lower melting point than the release adhesive.

Variable	Mean	SD	Min	Max	Skewness	Kurtosis	Normality
Age	35.2	12.5	18	65	0.15	3.2	0.98
Gender	1.2	0.4	1	2	0.05	3.0	0.99
Marital Status	1.5	0.5	1	3	0.10	3.1	0.99
Education	12.5	2.5	8	16	0.20	3.3	0.97
Income	15000	8000	5000	30000	0.30	3.5	0.95
Health	1.8	0.6	1	3	0.08	3.0	0.99
Stress	2.5	0.8	1	4	0.12	3.2	0.98
Depression	1.5	0.5	1	3	0.05	3.0	0.99
Life Satisfaction	3.5	1.0	1	5	0.18	3.4	0.96
Work Satisfaction	3.0	0.9	1	5	0.22	3.6	0.94
Family Satisfaction	3.8	1.1	1	5	0.16	3.3	0.97
Community Satisfaction	3.2	0.9	1	5	0.20	3.5	0.95
Overall Satisfaction	3.3	1.0	1	5	0.19	3.4	0.96

Variable	Mean	SD	Min	Max	Skewness	Kurtosis	Normality
Age	35.2	12.5	18	65	0.15	3.2	0.98
Gender	1.2	0.4	1	2	0.05	3.0	0.99
Marital Status	1.5	0.5	1	3	0.10	3.1	0.99
Education	12.5	2.5	8	16	0.20	3.3	0.97
Income	15000	8000	5000	35000	0.30	3.5	0.95
Health	1.8	0.6	1	3	0.08	3.0	0.99
Stress	2.5	0.8	1	4	0.12	3.2	0.98
Depression	1.5	0.5	1	3	0.10	3.1	0.99
Life Satisfaction	3.5	1.0	1	5	0.18	3.4	0.96
Work Satisfaction	3.0	0.9	1	5	0.22	3.6	0.94
Family Satisfaction	3.8	1.1	1	5	0.16	3.3	0.97
Community Satisfaction	3.2	0.9	1	5	0.20	3.5	0.95
Overall Satisfaction	3.3	1.0	1	5	0.19	3.4	0.96

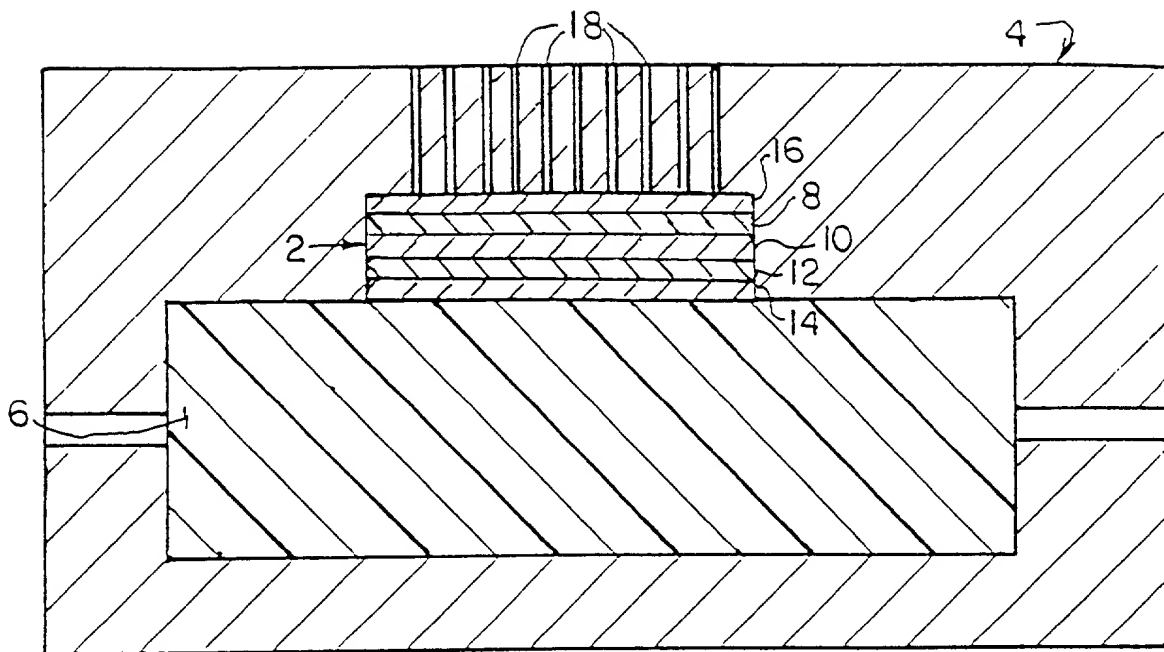


FIG. 1

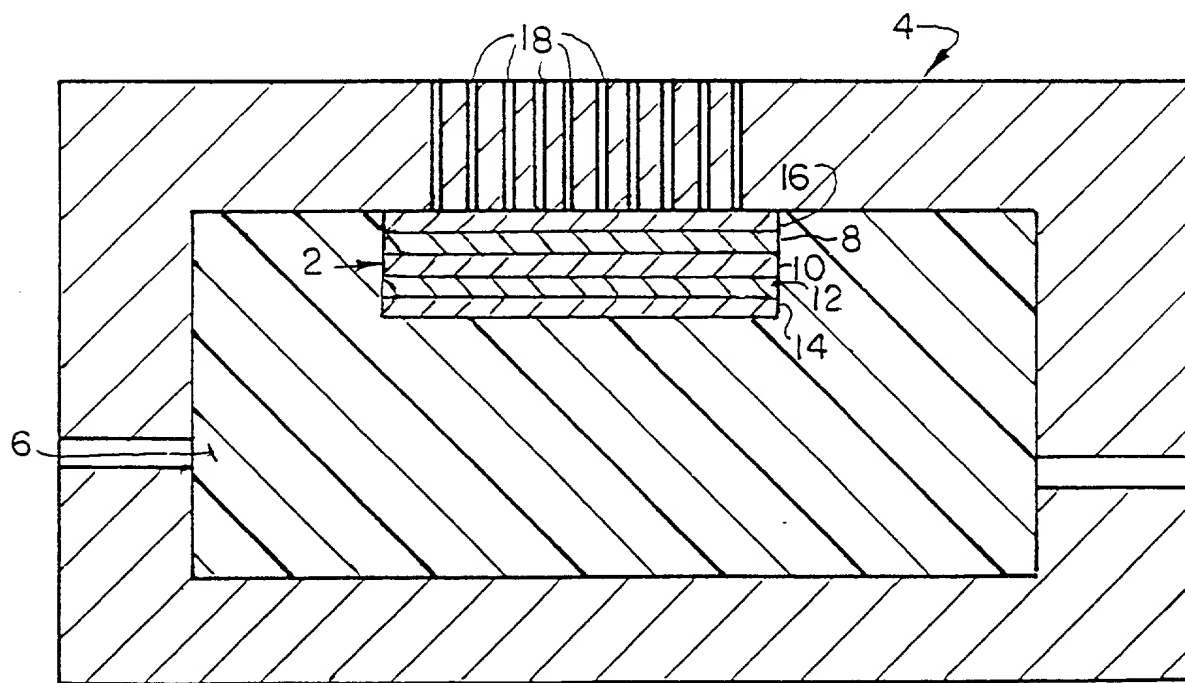


FIG. 2

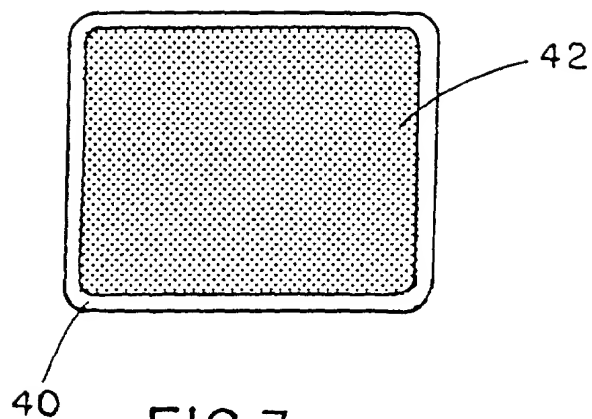


FIG. 3

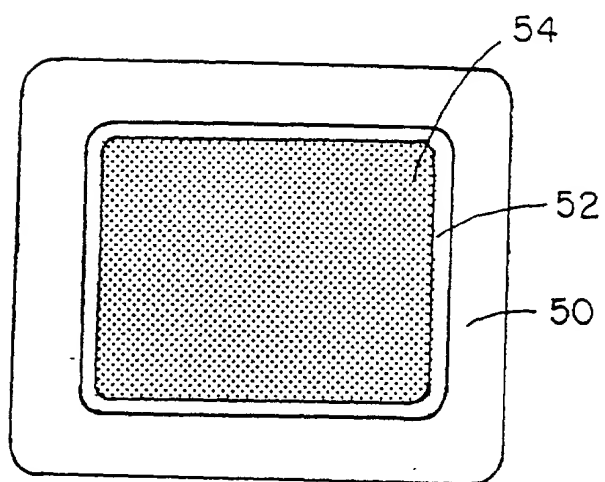


FIG. 4

[illegible]

My residence, post office address and citizenship are as stated below next to my name.

CO-MOLDED FLOCK TRANSFER AND METHOD

[illegible]

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Prior Foreign Application(s): Priority Claimed

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below: NA

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a).which occurred between the filing date of the prior application and the national or PCT international filing date of this application: N/A

(Serial No.) (Filing Date) (Status)

I do hereby appoint Paul M. Denk, Patent Office registration No. 22,598, with offices at 763 South New Ballas Road, St. Louis, Missouri 63141, Tel. No. (314) 872-8136, as my attorney and agent with full power of substitution and revocation, to prosecute the application above set forth, and to transact all business in the United States Patent and Trademark Office in connection therewith.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole inventor:

Louis Brown Abrams

Inventor's signature:

Louis Brown Abrams

Date:

4 July 2000

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